REPORT

60 DUNDAS STREET EAST

MISSISSAUGA, ONTARIO

NOISE AND VIBRATION IMPACT STUDY

RWDI #220763

December 12, 2022

SUBMITTED TO

Michael Bissett, MCIP, RPP
Partner
mbissett@bousfields.ca

BOUSFIELDS INC.
3 Church Street, Suite 200
Toronto, ON, Canada M5E 1M2
T: 416.947.9744

SUBMITTED BY

Kelly Baah, M.Eng., P.Eng.
Project Manager
E: Kelly.Baah@rwdi.com

Gillian Redman, M.Sc., P.Eng.
Senior Noise and Vibration Engineer
E: Gillian.Redman@rwdi.com

RWDI
600 Southgate Drive
Guelph, Ontario, N1G 4P6
T: 519.823.1311

VERSION HISTORY

Index	Date	Description	Prepared by	Reviewed by
1	February 25, 2022	Draft	LRC	GER
2	December 1, 2022	Updated for new massing	LRC	GER

EXECUTIVE SUMMARY

RWDI was retained to prepare a Noise and Vibration Impact Study for the proposed 60 Dundas Street East development located in Mississauga, Ontario. The proposed development will consist of two podiums with three towers.

The following noise control measures are recommended for the proposed development:

1. Installation of central air-conditioning so that all suites' windows can remain closed.
    a. STC-27, STC-45, and STC-28 are recommended for the minimum sound insulation ratings for the window, exterior wall, and exterior door respectively on the north façade of Building A. These STC ratings would be achieved with the Ontario Building Code minimum construction requirements.
2. Construction of a perimeter noise barrier along a portion of the property line if feasible.
3. The inclusion of noise warning clauses related to transportation sound levels at the building façade, and in the outdoor amenity areas if a barrier is not provided.

Vibration from the LRT to the south-west along Hurontario Street at the proposed development is not expected due to the setback being greater than the worst case setback noted in the project's Environmental Project Report.

At this stage in design the impact of the development on itself and its surroundings could not be quantitatively assessed. However, the impact on both the building itself and its surroundings is expected to be feasible to meet the applicable criteria. We recommend that the building design be evaluated as a condition of site plan approval to ensure that the acoustical design is adequately implemented to meet the applicable criteria.

Based on the results of the analysis for the given site plan and the implementation of the recommendations included with this assessment, the proposed development is predicted to meet the applicable sound and vibration criteria.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1 INTRODUCTION

RWDI was retained to prepare a Noise and Vibration Impact Study for the proposed 60 Dundas Street East development located in Mississauga, Ontario. The proposed development will consist of two podiums with three towers. The context site plan is shown in **Figure 1**.

The site is exposed to noise from road traffic on Dundas Street to the north, Hurontario Street to the west, and Camila Road to the east. There is no existing exposure to rail traffic at the site, the potential impacts from the future Hurontario LRT is included in the assessment. The GO Milton line, over 500 m to the north is not expected to have a impact on the development.

This assessment was completed to support the site plan approval (SPA) submission as required by the City of Mississauga. This assessment was based on design drawings dated October 31, 2022.

2 APPLICABLE CRITERIA

Applicable criteria for transportation noise sources (road and rail), stationary noise sources and rail vibration are adopted from the Ontario Ministry of the Environment, Conservation and Parks (MECP) NPC-300 Environmental Noise Guideline (MOE, 2013), with a summary of the applicable criteria included with **Appendix A**.

The proposed development site would be characterized as a “Class 1 Area”, which is defined according to NPC-300 as an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the activities of people, usually road traffic, often referred to as "urban hum."

3 IMPACT OF THE ENVIRONMENT ON THE PROPOSED DEVELOPMENT

3.1 Stationary Sources

The character of the surrounding area is a mixture of residential and commercial developments with no industrial uses of concern. The existing stationary sources surrounding the development are expected to meet the applicable guidelines.

3.2 Transportation Source Assessment

3.2.1 Road Traffic Volume Data

The Annual Ultimate Daily Traffic (AUDT) volumes, traffic makeup, and day-night split were obtained from the City of Mississauga.

A summary of the traffic data used is included in **Table 1** below with more detailed information included in **Appendix D**.

Table 1: Road Traffic Volumes

Roadway	Future Traffic (AUDT)	% Day/Night	Speed Limit (km/hr)	% Trucks
Hurontario Street	31700	90% / 10%	50	3.8%
Dundas Street	33200	90% / 10%	50	5.7%
Camilla Road	8600	90% / 10%	40	2.9%

3.2.2 Rail Traffic Volume Data

Traffic on the future Hurontario LRT was included in the assessment. The publicly available information (Mississauga 2014) indicates that the LRT will be designed for up to 5-minute interval service during peak hours. It was conservatively assumed that the during the daytime a total of 96 trains will run and at nighttime 14 trains will run, averaging 10- and 15-minute service respectively, with the understanding the LRT does not operate from 1:30 AM to 5:00 AM.

Excerpts from the publicly available project documentation is included in **Appendix D**.

3.2.3 Representative Receptors

The selection of receptors affected by transportation noise sources was based on the drawings reviewed for this assessment. Using the "building evaluation" feature of Cadna/A, each façade of the residential buildings was assessed.

Outdoor Living Areas (OLAs) would include outdoor areas intended and designed for the quiet enjoyment of the outdoor environment and which are readily accessible from the building. OLAs may include any common outdoor amenity spaces associated with a multi-unit residential development (e.g. courtyards, roof-top terraces), and/or private backyards and terraces with a minimum depth of 4m provided they are the only outdoor living area for the occupant. Daytime sound levels were assessed at the following identified OLAs:

- OLA_A1: Rooftop Amenity 3rd Storey
- OLA_B1: Rooftop Amenity 14th Story
- OLA_B2: Rooftop Amenity 28th Story
- OLA_G1: Outdoor Amenity at Grade

The OLAs are indicated in **Figure 2**.

3.2.4 Transportation Source Assessment - Analysis and Results

Sound levels due to the adjacent transportation (road and rail) sources were predicted using the RLS-90 standard (RLS,1990), and FTA method (FTA, 2018) as implemented in the Cadna/A software package.

To assess the impact of transportation noise on suites, the maximum sound level on each façade was determined with the results summarized in **Table 2**.

Table 2: Predicted Ground Transportation Source Sound Levels – Plane of Window

Building	Façade	Road		Rail (Streetcar/LRT)		Notes
		Day L_{EQ}, 16hr	Night L_{EQ}, 8hr	Day L_{EQ}, 16hr	Night L_{EQ}, 8hr	
Building A	North	68	61	44	39	2
	East	68	61	38	33	2
	South	58	51	46	41	1
	West	68	61	47	42	2
Podium Building B & C	North	61	54	45	39	1
	East	59	53	38	33	1
	South	53	47	43	38	-
	West	60	54	47	42	1
Tower B (West)	North	60	53	44	39	1
	East	55	49	39	33	1
	South	53	46	43	38	-
	West	60	54	47	41	1
Tower C (East)	North	61	54	43	38	1
	East	59	53	30	25	1
	South	53	47	41	36	-
	West	55	49	43	38	1

Notes:

1. Installation of air-conditioning to allow for windows and doors to remain closed, warning clause "Type-D". Refer to **Appendix C** for guidance regarding air-conditioning as a noise mitigation measure.
2. The acoustical performance of building components must be specified to meet the indoor sound level criteria. Installation of air conditioning to allow for windows and doors to remain closed, warning clause "Type-D". Refer to **Appendix C** for guidance regarding air-conditioning as a noise mitigation measure.

To assess the impact of transportation noise on the qualifying OLAs for the development, predicted sound level results are summarized in **Table 3.**

Table 3: Transportation Sound Levels in Outdoor Living Areas (OLAs)

Receptor	Description	Daytime L_{EQ}, 16hr	Notes
OLA_A1	Rooftop Amenity 3rd Storey	49 dBA	1
OLA_B1	Rooftop Amenity 14th Story	46 dBA	1
OLA_B2	Rooftop Amenity 28th Story	46 dBA	1
OLA_G1	Outdoor Amenity at Grade	57 dBA	2

Notes:

1. The predicted sound level meets the NPC-300 criterion for OLAs. Noise control measures are not required.
2. For OLA sound levels >55 dBA and ≤60 dBA, noise controls may be applied to meet the 55 dBA criterion. If noise control measures are not provided, a warning clause "Type A" is recommended.

3.3 Rail Vibration Assessment

Vibration analysis was completed for the design of the LRT and included in **Appendix D**. It states the worst case for vibration as "Any sensitive receptors located at least 25 m from line of the nearest track wherever the LRT travels at 80 km/h will mee the guideline limit of 0.10 mm/s without any additional control measures". The setback to the proposed development is approximately 160 m, therefore vibration from the LRT and the proposed development is not expected to be a concern.

3.4 Recommendations

Based on the noise and vibration impact assessment results, the following recommendations were determined for the project. Recommendations are provided for both transportation sources and stationary sources.

3.4.1 Transportation Sources

The following recommendations are provided to address transportation sources.

3.4.1.1 Building Façade Components

Due to the elevated transportation sound levels in the area, acoustical design of the façade components including spandrel, window glazing, and exterior doors, are recommended to be specified for the proposed development.

To assess the development's feasibility, preliminary window glazing, and exterior balcony door sound isolation requirements were determined. These were based on following assumptions:

- Typical residential living room:
  - Glazing 60% of façade, Door: 20% of façade
  - 55% Façade to floor area Ratio
- Typical residential bedroom:
  - Glazing 80% of façade, Door: N/A
  - 81% Façade to floor area Ratio
- Acoustical character of rooms: High absorption finishes/furniture for bedrooms and intermediate absorption finishes/furniture for living rooms.

The STC recommendations are determined using the National Research Council of Canada "BPN-56 method" (NRCC, 1985). Based on the predicted plane of window sound levels (**Table 2**) and the assumptions listed above, STC-27, STC-45, and STC-28 are recommended for the minimum sound insulation ratings for the window, exterior wall, and exterior door respectively on the north façade of Building A. These STC ratings would be achieved with the Ontario Building Code Minimum requirements.

3.4.1.2 Ventilation Recommendations

Due to the transportation sound levels at the façade, central air conditioning is recommended for the proposed development to allow for windows and doors to remain closed as a noise mitigation measure. Further, prospective purchasers or tenants should be informed by a warning clause "Type D".

3.4.1.3 Outdoor Living Areas

Due to exposure to transportation sources along existing nearby roads and the future Hurontario LRT. The combined (rail and road) daytime average sound levels for the OLAs included in the assessment are in the range of 46 dBA to 57 dBA. One OLA exceeded the guidelines, to reduce the transportation sound levels in OLA_G1 such that they meet the applicable guidelines, a 2.5 m tall noise barrier is recommended along a portion of the property line. The recommended location of the noise barrier is included on **Figure 3**. If noise control measures are not provided, a warning clause "Type-A" is recommended. General guidance with respect to noise barrier design is included with **Appendix C**.

3.4.2 Warning Clauses

The following warning clauses are recommended for the proposed development:

1. NPC-300" Type-A" to address transportation sound levels in Outdoor Living Areas (OLAs) as applicable
2. NPC-300 "Type-D" to address transportation sound levels at the plane of window

Warning clauses are recommended to be included on all development agreements, offers of purchase and agreements of purchase and sale or lease. The wording of the recommended warning clauses is included with **Appendix B**.

4 IMPACT OF THE PROPOSED DEVELOPMENT ON ITS SURROUNDINGS AND ON ITSELF

On-site stationary sources for the development are expected to consist of HVAC related equipment in the roof-top mechanical penthouse as well as various exhaust fans. Further, consideration should be given to control airborne and structure-borne noise generated within the proposed development.

Within the development itself the main sources of noise that are likely to affect the uses of the building are the mechanical systems. The potential noise impact of the commercial component is expected to be minimal and not impact the requirements for the building, it is best practice to be review this during detailed design, to ensure the applicable criteria will be met.

Provided that best practices for the acoustical design of the building are followed, noise from building services equipment associated with the development are expected to be feasible to meet the applicable sound level criteria due to the nature (residential/mixed-use) of the proposed development.

We recommend that the potential noise impact of the proposed development is reviewed during detailed design to ensure the applicable sound level criteria will be achieved.

5 CONCLUSIONS

RWDI was retained to prepare a Noise and Vibration Impact Study for the proposed 60 Dundas Street East development located in Mississauga, Ontario.

The following noise control measures are recommended for the proposed development:

1. Installation of central air-conditioning so that all suites' windows can remain closed.
    a. STC-27, STC-45, and STC-28 are recommended for the minimum sound insulation ratings for the window, exterior wall, and exterior door respectively on the north façade of Building A. These STC ratings would be achieved with the Ontario Building Code Minimum requirements.
2. Construction of a perimeter noise barrier along portion of the property line if feasible.
3. The inclusion of noise warning clauses related to transportation sound levels at the building façade, and in the outdoor amenity areas if a barrier is not provided

Vibration from the LRT to the south-west along Hurontario Street at the proposed development is not expected due to the setback being greater than the worst case setback noted in the project's Environmental Project Report.

At this stage in design the impact of the development on itself and its surroundings could not be quantitatively assessed. However, the impact on both the building itself and its surroundings is expected to be feasible to meet the applicable criteria.

We recommend that the building design be evaluated as a condition of site plan approval to ensure that the acoustical design is adequately implemented to meet the applicable criteria.

Based on the results of the analysis for the given site plan and the implementation of the recommendations included with this assessment, the proposed development is predicted to meet the applicable sound and vibration criteria.

6 REFERENCES

1. Ontario Ministry of the Environment (MOE), August 2013, Publication NPC-300, Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning (MOE, 2013).
2. Richtlinien für den Lärmschutz an Strassen (RLS). BM für Verkehr, Bonn, 1990 (RLS, 1990).
3. The Railway Association of Canada (RAC), Guidelines for New Development in Proximity to Railway Operations (RAC, 2013).
4. Controlling Sound Transmission into Buildings (BPN-56), National Research Council Canada (NRCC, 1985).
5. Federal Transit Administration, U.S. Department of Transportation, Transit Noise and Vibration Impact Assessment, 2018 (FTA, 2018).
6. City of Mississauga, City of Brampton, and Metrolinx, Hurontario-Main LRT Project Preliminary Design TPAP Environmental Project Report (Mississauga, 2014)

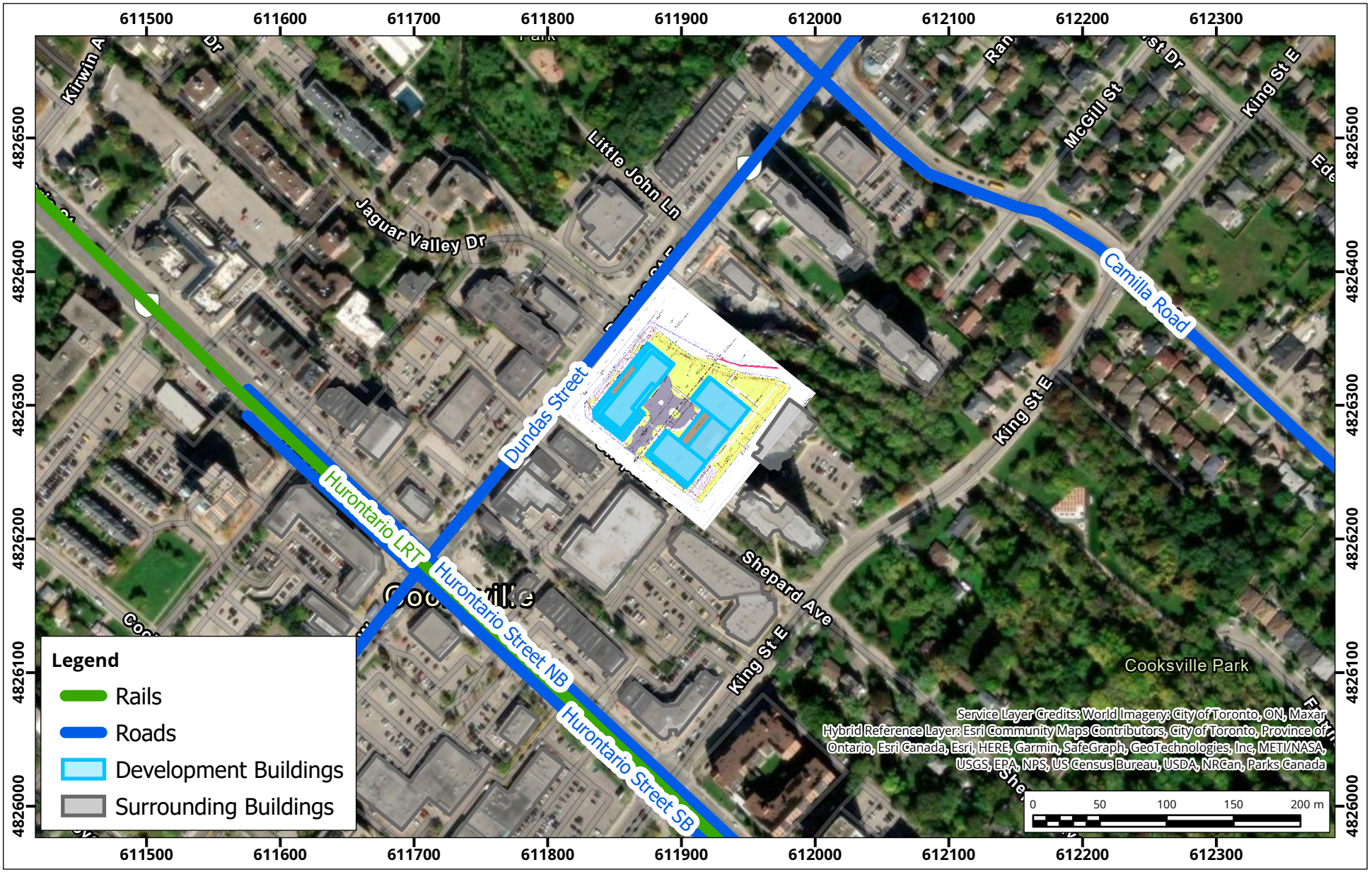
7 STATEMENT OF LIMITATIONS

This report entitled "60 Dundas Street East, Mississauga, ON" dated December 1, 2022, was prepared by Rowan Williams Davies & Irwin Inc. ("RWDI") for Bousfields Inc ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

FIGURES



Site Context Plan

True North

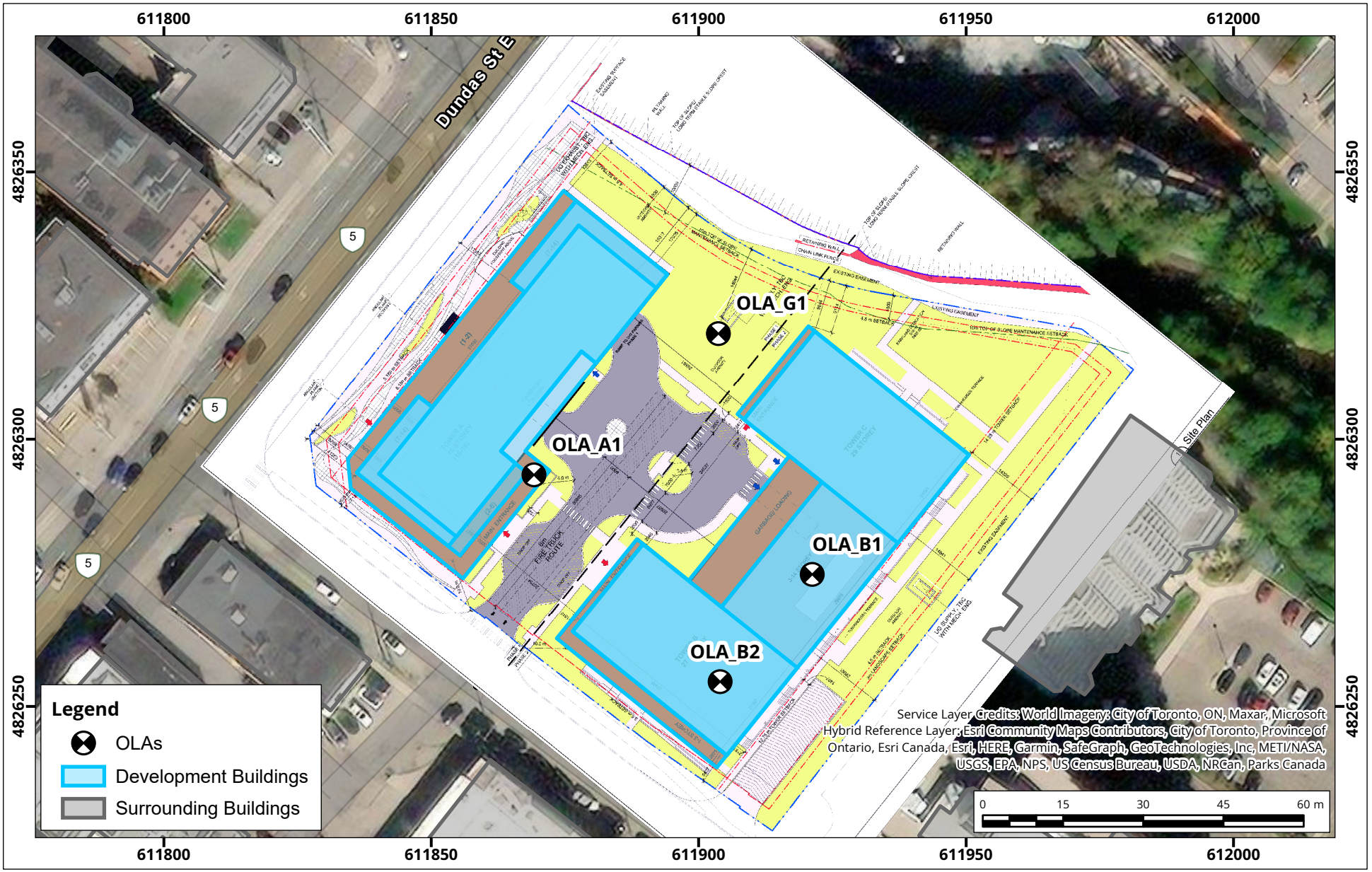
Drawn by: LRC	Figure:	1
Approx. Scale:	1:4,000	
Date Revised:	Dec 1, 2022	

Map Projection: NAD 1983 UTM Zone 17N

60 Dundas Street East - Mississauga, ON

Project #: 2202763

Map Document: \\rwdgroup\guelph\Jobs_3\2202763\03WorkItems\20EnvironmentalNoiseAnalysis\ArcGIS\60DundasEastMississauga\60DundasEastMississauga.aprx



Outdoor Living Areas (OLAs)

True North

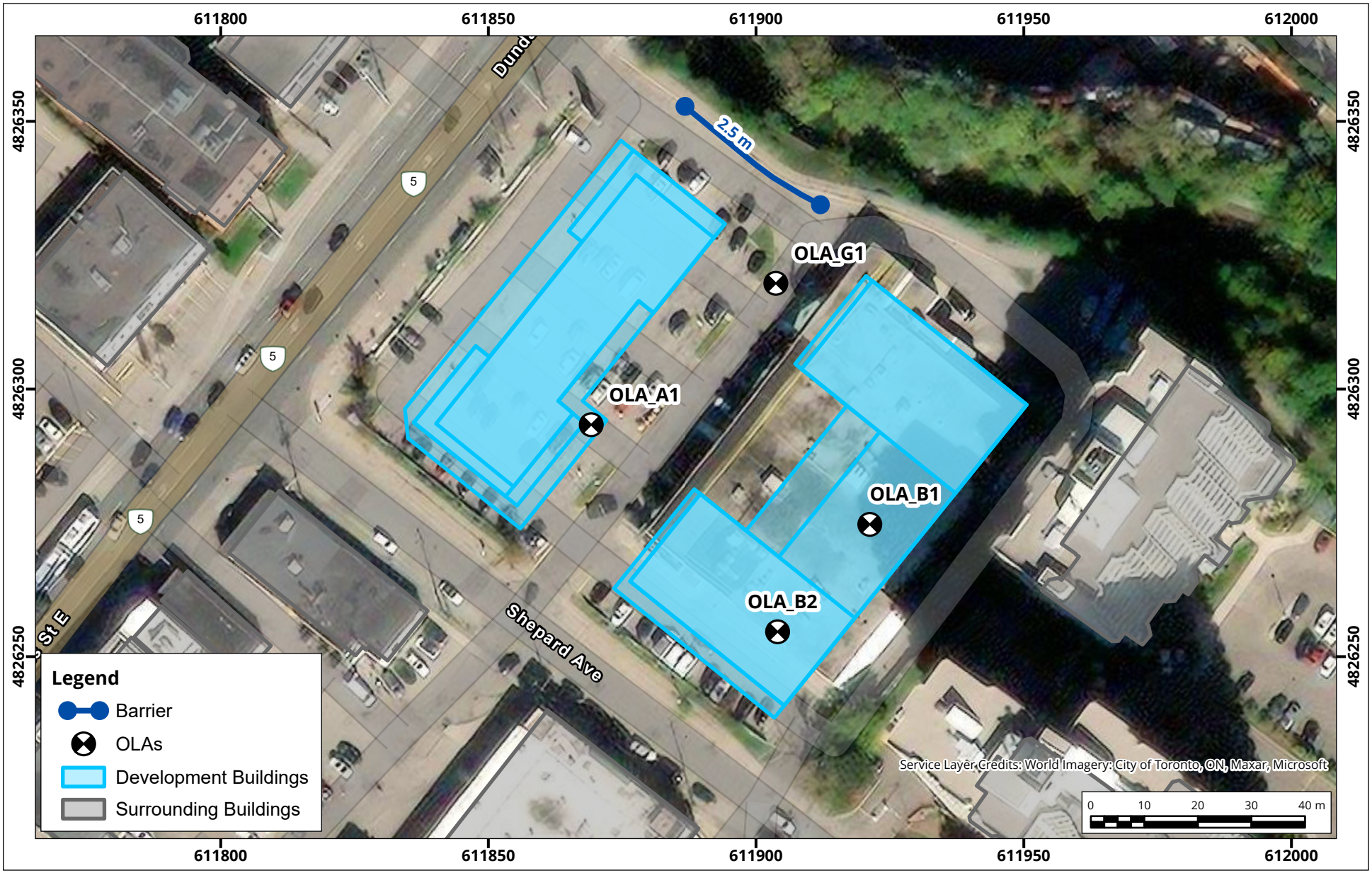
Drawn by:	LRC	Figure:	2
Approx. Scale:	1:1,000		
Date Revised:	Dec 1, 2022		

Map Projection: NAD 1983 UTM Zone 17N

60 Dundas Street East - Mississauga, ON

Project #: 2202763

Map Document: \\rwdgroup\guelph\Jobs_3\2202763\03WorkItems\20EnvironmentalNoiseAnalysis\ArcGIS\60DundasEastMississauga\60DundasEastMississauga.aprx



OLA Noise Mitigation to meet 55 dBA

True North

Drawn by: LRC | Figure: 3

Approx. Scale: 1:1,000

Date Revised: Nov 28, 2022

Map Projection: NAD 1983 UTM Zone 17N

60 Dundas Street East - Mississauga, ON

Project #: 2202763

Map Document: \\rwdgroup\guelph\Jobs_3\2202763\03WorkItems\20EnvironmentalNoiseAnalysis\ArcGIS%60DundasEastMississauga\60DundasEastMississauga.aprx

APPENDIX A

APPENDIX A: CRITERIA

A.1 Transportation Sources

Guidance from the Ontario Ministry of the Environment, Conservation and Parks (MECP) NPC-300 Environmental Noise Guideline was used to assess environmental noise generated by transportation-related sources. There are three aspects to consider, which include the following:

i. Transportation source sound levels in indoor living areas (living rooms and sleeping quarters), which determines building façade elements (windows, exterior walls, doors) sound insulation design recommendations.
ii. Transportation source sound levels at the plane of the window, which determines air-conditioning and ventilation system recommendations and associated warning clauses which inform the future occupants that windows and doors must be closed in order to meet the indoor sound level criteria.
iii. Transportation source sound levels in Outdoor Living Areas (OLAs), which determines OLA noise mitigation and related warning clause recommendations.

A.1.1 Road and Rail

A.1.1.1 Indoor Sound Level Criteria

For assessing sound originating from transportation sources, NPC-300 defines sound level criteria as summarized in Table 1 for indoor areas of sensitive uses. The specified values are maximum sound levels and apply to the indicated indoor spaces with the windows and doors closed.

Table 1: Indoor Sound Level Criteria for Road and Rail Sources

Type of Space	Source	Sound Level Criteria (Indoors)	
		Daytime $L_{eq,16\text{-}hr}$ 07:00h – 23:00h	Nighttime $L_{eq,8\text{-}hr}$ 23:00h – 07:00h
Living Quarters Examples: Living, dining and den areas of residences, hospitals, nursing homes, schools and daycare centres	**Road**	45 dBA	
	Rail	40 dBA	
Sleeping Quarters	**Road**	45 dBA	40 dBA
	Rail	40 dBA	35 dBA

NPC-300 also provides guidelines for acceptable indoor sound levels that are extended to land uses and developments which are not normally considered noise sensitive. The guideline sound level criteria presented in Table 2 are provided to inform good-practice design objectives.

Table 2: Supplementary Indoor Sound Level Criteria for Road and Rail Sources

Type of Space	Source	Sound Level Criteria (Indoors)	
		Daytime $L_{eq,16\text{-}hr}$ 07:00h – 23:00h	Nighttime $L_{eq,8\text{-}hr}$ 23:00h – 07:00h
General offices, reception areas, retail stores, etc.	**Road**	50 dBA	-
	Rail	45 dBA	-
Theatres, places of worship, libraries, individual or semi-private offices, conference rooms, reading rooms, etc.	**Road**	45 dBA	-
	Rail	40 dBA	-
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	**Road**	-	40 dBA
	Rail	-	35 dBA
Sleeping quarters of hotels/motels	**Road**	-	45 dBA
	Rail	-	40 dBA

A.1.1.2 Outdoor Living Areas (OLAs)

Outdoor Living Areas (OLAs) would include outdoor areas intended and designed for the quiet enjoyment of the outdoor environment and which are readily accessible from the building.

OLAs may include any common outdoor amenity spaces associated with a multi-unit residential development (e.g. courtyards, roof-top terraces), and/or private backyards and terraces with a minimum depth of 4m provided they are the only outdoor living area for the occupant. The sound level criteria for outdoor living areas is summarized in Table 3.

Table 3: Sound Level Criteria – Outdoor Living Area

Assessment Location	Sound Level Criteria (Outdoors)	
	Daytime $L_{eq,16\text{-}hr}$ 07:00h – 23:00h	Nighttime $L_{eq,8\text{-}hr}$ 23:00h – 07:00h
Outdoor Living Area (OLA) (Combined Road and Rail)	55 dBA	-

A.1.1.3 Outdoor and Plane of Window Sound Levels

In addition to the sound level criteria, noise control measures and requirements for ventilation and warning clauses requirements are recommended for residential land-uses based on predicted transportation source sound levels incident in the plane of window at bedrooms and living/dining rooms, and/or at outdoor living areas. These recommendations are summarized in Table 4 below.

Table 4: Ventilation, Building Component, and Warning Clauses Recommendations for Road/Rail Sources

Assessment Location	Transportation Sound Level (Outdoors)		Recommendations
	Daytime $L_{eq,16\text{-}hr}$ 07:00h – 23:00h	Nighttime $L_{eq,8\text{-}hr}$ 23:00h – 07:00h	
Plane of Window (Road)	> 65 dBA	> 60 dBA	Installation of air conditioning to allow windows to remained closed. The sound insulation performance of building components must be specified and designed to meet the indoor sound level criteria. Warning clause “Type D” is recommended.
	> 55 dBA	> 50 dBA	Applicable for low and medium density development: Forced-air ventilation system to allow for the future installation of air-conditioning. Warning clause “Type C” is recommended. Applicable for high density development: Air conditioning to allow windows to remained closed. Warning clause “Type D” is recommended.

Assessment Location	Transportation Sound Level (Outdoors)		Recommendations
	Daytime $L_{eq,16\text{-}hr}$ 07:00h – 23:00h	Nighttime $L_{eq,8\text{-}hr}$ 23:00h – 07:00h	
Plane of Window (Rail [1, 2])	> 60 dBA	> 55 dBA	The acoustical performance of building façade components should be specified such that the indoor sound level limits are predicted to be achieved. Warning clause "Type D" is recommended.
	> 60 dBA ($L_{eq,\ 24hr}$) and < 100m from tracks		Exterior walls consisting of a brick veneer or masonry equivalent for the first row of dwellings. Warning clause "Type D" is recommended.
Outdoor Living Area (Combined Road and Rail [3])	≤ 60 dBA > 55 dBA	-	If sound levels are predicted to exceed 55 dBA, but are less than 60 dBA, noise controls may be applied to reduce the sound level to 55 dBA. If noise control measures are not provided, a warning clause "Type A" is recommended.
	> 60 dBA	-	Noise controls (barriers) should be implemented to meet the 55 dBA criterion. If mitigation is not feasible to meet the 55 dBA criterion for technical, economic or administrative reasons, an exceedance of 5 dB may be acceptable (to a maximum sound level of 60 dBA). In this case a warning clause "Type B" would be recommended.

Notes:

1. Whistle noise is included (if applicable) in the determination of the sound level at the plane of window.
2. Some railway companies (e.g. CN, CP) may require that the exterior walls include a brick veneer or masonry equivalent for the façade facing the railway line, regardless of the sound level.
3. Whistle noise is not included in the determination of the sound level at the OLA.

A.1.1.4 Rail Vibration Criteria

An assessment of rail vibration is generally recommended for developments within 75m of a rail corridor or rail yard, and adjacent to or within a setback of 15m of a transit (subway or light-rail) rail line.

The generally accepted vibration criterion for sensitive land-uses is the threshold of perception for human exposure to vibration, being a vibration velocity level of 0.14 mm/s RMS in any one-third octave band centre frequency in the range of 4 Hz to 200 Hz.

This vibration criterion is based on a one-second exponential time-averaged maximum hold root-mean-square (RMS) vibration velocity level and is consistent with the Railway Associations of Canada (RAC, 2013) guideline, the U.S. Federal Transit Authority (FTA, 2018) criterion for residential land-uses, the Toronto Transit Commission (TTC) guidelines for the assessment of potential vibration impact of future expansion (MOEE/TTC, 1993).

APPENDIX B

APPENDIX B: WARNING CLAUSES

Warning clauses are recommended to be included on all development agreements, offers of purchase and agreements of purchase and sale or lease. Warning clauses may be used individually or in combination.

The following warning clauses are recommended based on the applicable guidelines; however, wording may be modified/customized during consultation with the planning authority to best suit the proposed development:

B.1 Transportation Sources

NPC-300 Type A: Recommended to address surface transportation sound levels in OLAs if sound level is in the range of >55 dBA but ≤ 60 dBA, and noise controls have not been provided.

"Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air traffic) may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

NPC-300 Type B: Recommended to address surface transportation sound levels in OLAs if the sound level is in the range of >55 dBA but ≤ 60 dBA, and noise controls have been provided. Recommended to address outdoor aircraft sound levels ≥NEF 30.

"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic (rail traffic) (air traffic) may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

NPC-300 Type D: Recommended to address transportation sound levels at the plane of window.

"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."

APPENDIX C

APPENDIX C: NOISE MITIGATION GUIDANCE

C.1 Acoustic/Noise Barrier

Generally, noise controls to attenuate transportation sound levels at Outdoor Living Areas (OLAs) would consist of the implementation of acoustic/noise barriers with materials that would meet the guidance included in NPC-300, for example:

- A wall, berm, wall/berm combination or similar structure, used as a noise control measure, and high enough to break the line-of-sight between the source and the receptor.
- The minimum surface density (face weight) is 20 kg/m^2
    - Many materials could satisfy the surface density requirement, e.g. wood, glass, concrete, Plexiglas, Acrylite.
    - The required thickness can be determined by dividing the 20 kg/m^2 face weight by the material density (kg/m^3). Typically, this would imply:
        - 50 mm (2") thickness of wood
        - 13 mm (0.5") thickness of lighter plastic (like Plexiglas or PVC)
        - 6 mm (0.25") thickness of heavier material (like aluminum, glass, concrete)
- The barrier should be structurally sound, appropriately designed to withstand wind and snow load, and constructed without cracks or surface gaps. Joints between panels may need to be overlapped to ensure surfaces are free of gaps, particularly for wood construction.
- Any gaps under the barrier that are necessary for drainage purposes should be minimized and localized, so that the acoustical performance of the barrier is maintained.
- If a sound absorptive face is to be included in the barrier design, the minimum noise reduction coefficient is recommended to be NRC 0.7.

C.2 Building Ventilation and Air Conditioning

The use of air conditioning itself is not a noise control measure; however, it allows for windows and doors to remain closed, thereby reducing the indoor sound levels.

NPC-300 provides the following guidance with respect to implementation of building ventilation and air conditioning:

a. the noise produced by the proposed ventilation system in the space served does not exceed 40 dBA. In practice, this condition usually implies that window air conditioning units are not acceptable;
b. the ventilation system complies with all national, provincial and municipal standards and codes;
c. the ventilation system is designed by a heating and ventilation professional; and
d. the ventilation system enables the windows and exterior doors to remain closed.

Air conditioning systems also need to comply with Publication NPC-216, and/or any local municipal noise by-law that has provisions relating to air conditioning equipment.

APPENDIX D

Date:	07-Feb-22

NOISE REPORT FOR PROPOSED DEVELOPMENT

REQUESTED BY:

Name:	Amy Patenaude
Company:	RWDI

PREPARED BY:

Nam	Steven Guan
Tel#:	905-615-3200 ext. 5933

MISSISSAUGA

Location: Hurontario Street - Dundas Street to Queensway
Dundas Street East - Hurontario Street to Grenville Drive / Cliff Road
Camilla Road - Dundas Street East to King Street East

ID 535

ON SITE TRAFFIC DATA

Specific	Street Names				
	Hurontario St	Dundas St E	Camilla Rd		
AADT:	31,700	33,200	8,600		
# of Lanes:	4 Lanes*	4 Lanes	2 Lanes		
% Trucks:	4%	6%	3%		
Medium/Heavy Trucks Ratio:	55/45	55/45	55/45		
Day/Night Split:	90/10	90/10	90/10		
Posted Speed Limit:	50 km/h	50 km/h	40 km/h		
Gradient Of Road:	<2%	<2%	<2%		
Ultimate R.O.W:	35 m	42 m	26 m		

Comments:

Ultimate street data only (2041).

*Note: the future lane configuration of Hurontario Street at this location will consist of 4 through lanes with 2 LRT lines along the center of the roadway.

LRT System Elements

LRT Operations

The objective of the operational design criteria was to set out specifications that will help ensure reliable service, even during downgraded operating conditions. The operations will also vary to cater to the expected demand throughout the hours of operation. On a daily basis, revenue service is expected to commence at 5:00 a.m. from both terminal stops and end at 1:30 a.m. on weekdays and Saturdays, and operate between 7:00 a.m. and midnight on Sundays. The headway will be adjusted throughout operational service in order to comply with scheduling demands, with a minimum headway of 5 minutes during peak periods and decreasing in off-peak periods. The current operations plan will result in an average operating speed of 27 km/h and a one-way journey time of 47 minutes between the two end stops. This is achieved through partial segregation from other vehicular traffic and providing priority to LRT vehicles at signalized intersections (through the implementation of Intelligent Transportation System components), and the system will operate on an LRT vehicle priority green signal basis. In order to achieve this, the traffic signal system will be optimized, including the installation of an integrated system of location sensors, with specialized traffic controllers that use logical algorithms to define optimum cycle times for an LRT priority system throughout the corridor.

Light Rail Vehicle

The light rail vehicles will be multi-section articulated low-floor vehicles, with a maximum width of 2.65 m (excluding rear-view cameras) and a length of about 30 m (although longer units around 40 m long are also possible). Initially, the vehicles will typically be operated in two-unit consists (60 m long). The system has been designed to operate with three-unit consists up to a length of 90 m in the long term. Peak carrying capacity will be in the order of 200 passengers/vehicle, or 600 passengers per 3-vehicle consist.

Maintenance and Storage Facility

It is proopsed that the HMLRT Maintenance and Storage Facility (MSF) be situated on the provincially-owned lands within the Parkway Belt West bounded by Highway 407 to the north, Hurontario Street to the west, the Hydro One Networks Inc. transmission line and utility corridor to the south and Kennedy Road to the east. It will be connected to Hurontario Street via a dedicated spur line that diverges from the Hurontario Street corridor and runs east on Topflight Drive and north on Edwards Boulevard. The 7 ha MSF will accommodate up to 56 LRVs initially, and 74 over the long term. The HMLRT Control Centre will also be located on the MSF site. The MSF layout is shown in Appendix A.1 of this EPR.

Power Supply and Distribution

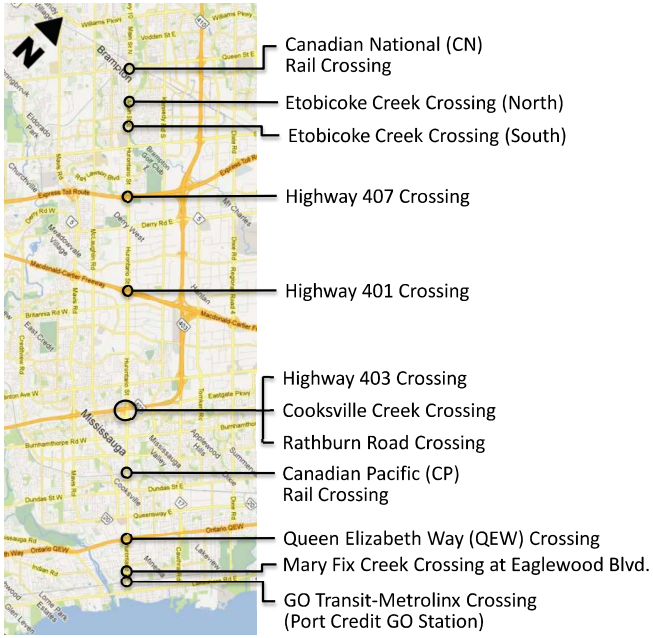
The system will be designed to provide the necessary power, as well as the voltage range, to ensure proper operation of the trains. The traction power system, consisting of traction power substations (TPSS) and the Overhead Contact System (OCS), will provide 750Vdc to power the trains. Due to concerns related to heritage attributes within the Main Street South Heritage Area and Downtown Brampton, (i.e., between the north crossing of Etobicoke Creek and the Brampton GO stop), an alternative power supply system (the option comprising battery packs or super/ultracapacitors installed on board the LRVs, with no Overhead Contact System) is being carried forward for further investigation of costs and benefits as part of the Detail Design phase. Its implementation is contingent upon final acceptability of financial and technical implications.

The system will be designed to allow for a single TPSS failure without any degradation of service. A preliminary estimate indicates that 15 TPSS would be needed for the mainline and one TPSS will be provided for the Maintenance and Storage Facility to meet the Service Level to 2031. The preliminary TPSS locations are shown in Appendix A.1 of this EPR.

Structures

A number of existing structures are affected by the proposed HMLRT design scheme. In addition, some new structures are proposed. The engineering investigations included an assessment of the condition of all existing structures in the LRT corridor, identified the new structures required, and offered recommendations for the structural work to be completed as part of the project. The structure locations are shown in Figure ES-3.

Figure ES-3: Key Plan for New and Upgraded Structures



The proposed structural work, as shown on the Preliminary Design plates in Appendix A.1, include:

- New bridges at:
  - GO Transit-Metrolinx Crossing (Port Credit GO Station) - immediately west of the existing bridge (box structure through the existing rail embankment);
  - Mary Fix Creek - Eaglewood Boulevard will be extended to Oriole Avenue (west of Hurontario Street) via a new bridge over the Mary Fix Creek channel;
  - Queen Elizabeth Way (QEW) - construction of a new bridge to carry the QEW over the realigned northbound lanes carrying general purpose traffic; and

Roadway	Intersection	2031 AM Peak Hour Traffic Volumes		Increase (dB)
		No Project	With Project	
Confederation Pkwy.	Hillcrest	1,623	1,735	0.3
Confederation Pkwy.	Dundas	1,259	1,232	-0.1
Confederation Pkwy.	King	583	812	1.4
Confederation Pkwy.	**Paisley**	**274**	**562**	**3.1**
Confederation Pkwy.	**Queensway**	**61**	**336**	**7.4**
Kennedy	Queen	1,331	1,375	0.1
Kennedy	Clarence	1,070	1,049	-0.1
Kennedy	Glidden	916	954	0.2
Kennedy	Steeles	706	680	-0.2
Kennedy	First Gulf Blvd.	943	1,068	0.5
Kennedy	Derry	808	934	0.6
Kennedy	Courtneypark	978	1,067	0.4
Kennedy	Matheson	676	721	0.3
Kennedy	Bristol	656	743	0.5
Central Pkwy.	Eglinton	1,038	1,140	0.4
Central Pkwy.	Rathburn	804	824	0.1
Central Pkwy.	Burnhamthorpe	675	645	-0.2
Central Pkwy.	Bloor	1,031	1,045	0.1
Central Pkwy.	Cliff	742	824	0.5
Central Pkwy.	Mississauga Valley South	685	815	0.8

As can be seen in the above table, the sound-level increases along parallel routes are quite minimal. Increases of less than 3 dB in the average sound levels are considered insignificant. The exceptions are shown in bold in Table 4-7, along a portion of Confederation Parkway. Here, the absolute sound levels increase between 3 and 7 dB. While this is a significant change, it should be taken in context with the absolute sound levels.

With peak-hour volumes of 336 vehicles per hour at Queensway, the sound levels at receptors along Confederation Parkway would be approximately 56 dB Leq during the daytime and 50 dBA Leq during the night-time. In comparing this to the MOEE/TTC draft protocol's baseline limit of 55 dBA during the daytime and 50 dBA during the night-time, the impacts are actually 1 dB and 0 dB, respectively.

Hence, overall, the diversion of traffic to parallel routes is minor and the acoustic effects are insignificant. Noise control measures are not warranted for any associated increases in traffic noise along the major parallel routes.

The potential vehicle wheel squeal has also been reviewed wherever the LRT corridor makes sharp turns. Generally, such turns occur at major intersections where the ambient sound levels are already quite high. Provided that the light rail vehicles are equipped with a wheel damping system, the increase in sound levels at the intersections is approximately 2-3 dB in the worst-case. Hence, further noise control measures to control wheel squeal are not required.

Maintenance and Storage Facility

A preliminary review of the MSF indicates that the noise from the facility will not be significant at the nearest sensitive receptors. The results of the modelling indicate that the sound level from the MSF will be approximately 55 dBA 1-hr Leq at the nearest sensitive receptor during the most sensitive hour. As the ambient sound level has been calculated to be 58 dBA at this location, an adverse impact is not expected.

The greatest contributors to the overall sound from the MSF are the noise from dust collector fans and the noise from wheel squeal. Also, there is some potential for noise from the paint booth fans, depending on the size of the fan selected.

Overall, given the distance between the MSF and the nearest sensitive receptor, and given the high ambient noise from Highway 407, a noise impact from the MSF is not expected.

Traction Power Substations

A preliminary review of the noise from the traction power substations (TPSS) has been completed. Based on measurements of similar transformers, it is assumed that each TPSS will produce a sound level of approximately 63 dBA at a distance of 3 m. The modelling indicates that, in most cases, the sound levels from the TPSS are well below the ambient sound levels at the nearest sensitive receptors and are also well below the MOE's minimum exclusion level of 45 dBA. Hence, noise control measures are not warranted for most of the TPSS. TPSS18, located near the Brampton GO Station, needs to be moved so that it is a minimum of 23 m from the nearest sensitive receptor to avoid the potential noise impacts. Alternatively, it should be ensured that the actual TPSS sound level output is less than or equal to 58 dBA at a distance of 3 m and that the sound level is not tonal.

Both the TPSS and the MSF will require ECAs from the MOE. A more detailed review of the noise affects of these facilities will be completed at that time.

Vibration

Based on the current design, the LRT will run as close as 5 to 10 m from the façades of some buildings. More typically, the LRT will run more than 20 m from the nearest building.

Any sensitive receptors located at least:

- 10 m from the centreline of the nearest track wherever the LRT travels at 40 km/h
- 15 m from the centreline of the nearest track wherever the LRT travels at 50 km/h
- 20 m from the centreline of the nearest track wherever the LRT travels at 60 km/h
- 25 m from the centreline of the nearest track wherever the LRT travels at 80 km/h

will meet the guideline limit of 0.10 mm/s without any additional vibration control measures. An additional 5 dB reduction (44% reduction) will be required for areas with residential receptors located closer than the minimum setbacks described above, in order to reduce the vibration levels to 0.10mm/s rms. For concrete embedded track, however, vibration control to limit vibration-induced noise is more critical and will supersede the requirements for ground-borne vibration mitigation.

The results of the assessment also suggest that some sensitive receptors (critical residential rooms) along the HMLRT corridor, including those within 50 m of special trackwork (crossovers, switches and pocket tracks) may experience levels of vibration-induced noise that require mitigation. Vibration levels immediately adjacent to special track structures can be up to 3 times (10 dB) greater than vibration levels on tangent track (assuming the speed remains the same).